Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

1. (Original) A method for separating an isotope of thallium in an atomic vapor containing a plurality of isotopes of thallium including said isotope, said method comprising the steps of:

(a) producing photons of a first frequency by a laser system, wherein said first frequency is about 378 nm;

(b) producing photons of a second frequency by said laser system, wherein said second frequency is about 292 nm;

(c) producing photons of a third frequency by said laser system, wherein said third frequency is in the range of 700 nm to 1400 nm;

(d) applying said photons of said first, second and third frequencies to said vapor of said thallium, wherein said photons of said first frequency pump isotope-selectively a plurality of ground state thallium atoms through an excited state into a metastable state, and wherein said photons of said second frequency excite a plurality of metastable state thallium atoms to an intermediate, resonant state, and wherein said photons of said third frequency ionize a plurality of atoms in said intermediate, resonant state through continuum states; and

(e) collecting said isotope ions.

2. (Original) The method of claim 1 wherein said photon of said first frequency is produced by one or more continuous wave lasers.

3. (Original) The method of claim 1 wherein said pumping is performed by applying said photons of said first frequency to pump optically and isotope-selectively said isotope of thallium from the ground state through a first excite state at an energy of 26477.6 cm^{-1} relative to the zero energy of said ground state into a metastable state at an energy of 7793 cm^{-1} relative to the zero energy of said ground state.

4. (Original) The method of claim 1 wherein said photon of said second frequency is produced by one or more pulsed lasers.

5. (Amended) The method of claim 1 ~~or 4,~~ wherein said exciting step by the photons of the second frequency to an intermediate, resonant ~~sate~~ state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42049.0 cm^{-1} relative to the zero energy of said ground state.

6. (Amended) The method of claim 1 ~~or 4,~~ wherein said exciting step by the photons of the second frequency to an ~~inermediate~~intermediate, resonant state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state.

7. (Original) The method of claim 1 wherein said photon of said third frequency is produced by one or more pulsed lasers.

8. (Original) The method of claim 1 wherein said ionizing step by the photons of the third frequency is performed by applying said photons of said third frequency to ionize atoms in said second excited state at an energy of 42049.0 cm^{-1} to continuum states at an energy range of 49266.7 cm^{-1} ~ 55000 cm^{-1} relative to the zero energy of said ground state.

9. (Original) The method of claim 1 wherein said ionizing step by the photons of the third frequency is performed by applying said photons of said third frequency to ionize atoms in said second excited state at an energy of 42011.4 cm^{-1} to continuum states at an energy range of 49266.7 cm^{-1} ~ 55000 cm^{-1} relative to the zero energy of said ground state.

10. (Original) The method of claim 1 wherein the step of collecting said isotope ions comprises applying an electric field to said vapor.

11. (New) The method of claim 4 wherein said exciting step by the photons of the second frequency to an intermediate, resonant state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42049.0 cm^{-1} relative to the zero energy of said ground state.

12. (New) The method of claim 6 wherein said exciting step by the photons of the second frequency to an intermediate, resonant state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of 42011.4 cm^{-1} relative to the zero energy of said ground state.